

<http://dx.doi.org/10.111646/zootaxa.3796.3.9>

<http://zoobank.org/urn:lsid:zoobank.org:pub:9FE80252-B513-4604-BD87-64A58218E458>

Description of *Cephalotes specularis* n. sp. (Formicidae: Myrmicinae) —the mirror turtle ant

CARLOS ROBERTO F. BRANDÃO^{1,5}, RODRIGO M. FEITOSA²,
SCOTT POWELL³ & KLEBER DEL-CLARO⁴

¹*Museu de Zoologia da Universidade de São Paulo, São Paulo, SP, Brazil. E-mail: crfbrand@usp.br*

²*Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, PR, Brazil. E-mail: rsmfeitosa@gmail.com*

³*Department of Biological Sciences, George Washington University, Washington, DC, U.S.A. E-mail: scottpowell@gwu.edu*

⁴*Instituto de Biologia, Universidade Federal de Uberlândia, Uberlândia Minas Gerais, Brazil. E-mail: delclaro@ufu.br*

⁵*Corresponding author. E-mail: crfbrand@usp.br*

Abstract

We describe here *Cephalotes specularis* n. sp. (Hymenoptera: Formicidae: Myrmicinae: Cephalotini) based on minor and major workers, gynes and larvae from Uberlândia, Minas Gerais state, Brazil. On morphological and molecular grounds, this new species belongs to the *C. fiebrigi* + *C. bruchi* species complex, of which there are 11 previously described species (one in *C. bruchi* group and 10 in the *C. fiebrigi* group). All members of these groups are found in, or are limited to the South American “arid diagonal”, comprised of the Argentinian Chaco, the Cerrados of central South America, and the Brazilian northeastern caatingas. Workers of *C. specularis* n. sp. have an extremely shiny gaster which is mirror-like, notwithstanding its sparse covering by minute hairs. This species engages in a form of resource-based social parasitism of the host ant *Crematogaster ampla* (Myrmicinae: Crematogastrini). *Cephalotes specularis* foragers move freely in the dense traffic of *Crematogaster ampla* foraging trails. They exhibit highly atypical body posturing for turtle ants, which makes them hard to distinguish from the *Crematogaster* foragers.

Key words: Cephalotini, Brazil, Cerrado, mirror ant

Introduction

The arboreal myrmicine genus *Cephalotes* is exclusive to the Neotropics and includes 117 valid extant species and 17 valid fossil species. *Cephalotes* was revised by de Andrade & Baroni Urbani (1999), who proposed the first phylogeny for the genus using morphological characters and recognized 24 morphological species groups. Three species were considered *incertae sedis* but the types were unavailable for study. Recent combined molecular and morphological phylogenetic analyses have provided additional insight into the phylogenetic relationships within and among the proposed morphological species group (Price et al. 2014) (see comments).

As part of a study on the ecology of *Cephalotes* and other arboreal ants in Cerrado areas of Uberlândia, Minas Gerais, Brazil we identified a *Cephalotes* species that did not match any previously described species. We here describe this species as *Cephalotes specularis* n. sp. The biology of the species has been studied extensively and there is a need for a name, justifying this isolated species description.

Material and methods

Observations were made at 60x magnification with a Leica MZ95 stereomicroscope. Images of the new *Cephalotes* species were obtained under a stereomicroscope Leica M205C attached to video camera Leica DFC 295. The photos were combined using the Leica Application Suite V3 system at MZSP. Images were then processed as TIFF files in Adobe Photoshop CS5 to enhance parameters of brightness and contrast. Measurements were obtained with

a micrometric reticule and recorded to the nearest 0.01mm. In the species description, measurement ranges are always presented as minimum–maximum values.

For Scanning Electron Microscopy (SEM), two mature larvae were dehydrated sequentially through a series of ethanol concentrations to 100% absolute and then critical-point dried in a Balzers CPD-030 using liquid CO₂ at the SEM Lab in the MZSP. Once the ethanol was replaced with CO₂ the samples were slowly heated to the critical point, slowly depressurized back to atmospheric pressure, dried, and mounted on aluminum stubs. The two prepared larvae and an adult worker paratype were sputter-coated with 60:40 wt% Gold:Palladium alloy to a thickness of 20–25 nm. SEMs of these specimens were generated using a Leo 440 Electron Microscope. All images were cropped and edited using Photoshop CS5® (Version 12.0) (Adobe Inc.).

Terminology. The terms for surface sculpturing and pilosity follow de Andrade & Baroni-Urbani (1999). Terminology for wing venation follows Yoshimura & Fisher (2011). The reproductive females are here called “gynes” (Feitosa & Brandão, 2008). De Andrade & Baroni-Urbani (1999, pg. 793) separated the worker caste of the polymorphic *Cephalotes* species into “workers” (small sized individuals) and “soldiers” (large sized individuals with a transverse ridge on the pronotal dorsum). The small individuals are here called “minor workers” and the specialized large individuals are here called “major workers”. These terms are behaviorally more appropriate since not all large workers play a defensive role in colonies of polymorphic ant species.

Characters and terminology used in the description of the larvae are based on Wheeler & Wheeler (1976).

Measurements and indices. All measurements follow de Andrade & Baroni-Urbani (1999) and are given in mm:

HL: the maximum head length measured dorsally on the sagittal plane.

HW: the maximum head width behind the eyes, including the vertexal expansions.

EL: the maximum measurable length of eyes in profile.

PW: the maximum width of the pronotum; in dorsal view, including the pronotal spines.

WL: the diagonal length of mesosoma in profile (Weber’s length), from the mid-point of the anterior pronotal declivity to the posterior basal angle of the metapleuron.

PTL: the maximum length of the petiole in dorsal view.

PTW: the maximum width of the petiole in dorsal view, including the petiolar spines.

PPL: the maximum length of the postpetiole in dorsal view.

PPW: the maximum width of the postpetiole in dorsal view.

GL: the maximum length of the first gastral tergite in dorsal view.

TL: the summed length of HL, WL, PTL, PPL, and GL.

CI: cephalic index. HW x 100/HL.

OI: optical index. EL x 100/HW.

PI: petiolar index. PTL x 100/PTW.

The following abbreviations are used for specimen depositories:

CPDC Centro de Pesquisas do Cacau, Itabuna, Bahia, Brazil.

DZUP Coleção Entomológica Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.

FMNH Field Museum of Natural History; Chicago, Illinois, U.S.A.

MZSP Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.

USNM National Museum of Natural History; Smithsonian Institution, Washington, DC, U.S.A.

Results

Cephalotes specularis Brandão, Feitosa, Powell & Del-Claro sp. nov.

Figures 1–7.

Holotype minor worker. BRAZIL: Minas Gerais: Uberlândia, Clube Caça & Pesca Itororó, -19.004587°, -48.312506° (hand held GPS with a reported error range of +/- 5 meters), 09.vi.2007, S. Powell col. [MZSP].



FIGURE 1. Minor workers of *Cephalotes specularis* n. sp. walking on a tree in the type-locality. Note the bright blue sky and clouds mirrored on the gaster. Picture taken by S. Powell.

Paratypes. Same data as holotype (4 workers and 2 gynes) [CPDC]; (7 workers and 2 gynes) [DZUP]; (4 workers and 2 gynes) [FMNH]; (200 workers and 14 gynes) [MZSP]; (4 workers and 2 gynes) [USNM].

Diagnosis. Polymorphic species of the *fiebrigi* species group (see clade diagnosis in de Andrade & Baroni Urbani, 1999: 623); eyes situated behind and slightly above the antennal scrobes; vertexal angles without projections; cephalic disc of major worker complete, covered by irregular rugae and erect clavate hairs; minor worker with dorsum of head and mesosoma convex in profile; propodeum with three pairs of lateral denticles; postpetiole with a well-developed ventral process; anterior borders of the first gastral tergite with solid membranaceous extensions; pilosity on the dorsal surface of first gastral tergite scarce to absent; gaster strongly shiny.

Composite description. Minor worker (Figs 1–2, 7). Holotype (paratypes): HL 1.21 (1.15–1.36); HW 1.21 (1.09–1.39); EL 0.30 (0.27–0.33); PW 0.91 (0.85–1.10); WL 1.24 (1.18–1.39); PTL 0.27 (0.24–0.33); PTW 0.55

(0.52–0.64); PPL 0.24 (0.24–0.30); PPW 0.59 (0.52–0.67); GL 1.33 (1.24–1.58); TL 4.30 (4.12–4.97); CI 100.00 (92.50–102.44); OI 25.00 (22.73–25.64); PI 50.00 (46.78–61.11). Color dark brown to black; frontal lobes pale yellow, with translucent elongate central portions; masticatory margins of mandibles, apices of the antennal scapes and femora, dorsum of the tibiae, body spine tips, and anterior extensions of first gastral tergite light brownish to ferruginous.

Body entirely lightly reticulate-punctate and weakly shiny, except for the gaster which is weakly reticulate and strongly shiny. Mandibles strongly punctate; dorsum of head and mesosoma foveolate, the head foveae tightly accommodate the canaliculated hairs and are more impressed near the vertexal margin and on the pronotal dorsum; external surfaces of femora and tibiae and dorsum of petiole and postpetiole weakly and irregularly foveolate; lateral surfaces of mesosoma with short longitudinal subparallel rugosities; anterior third of first gastral tergite with a few short longitudinal rugosities, originating from the postpetiole insertion.

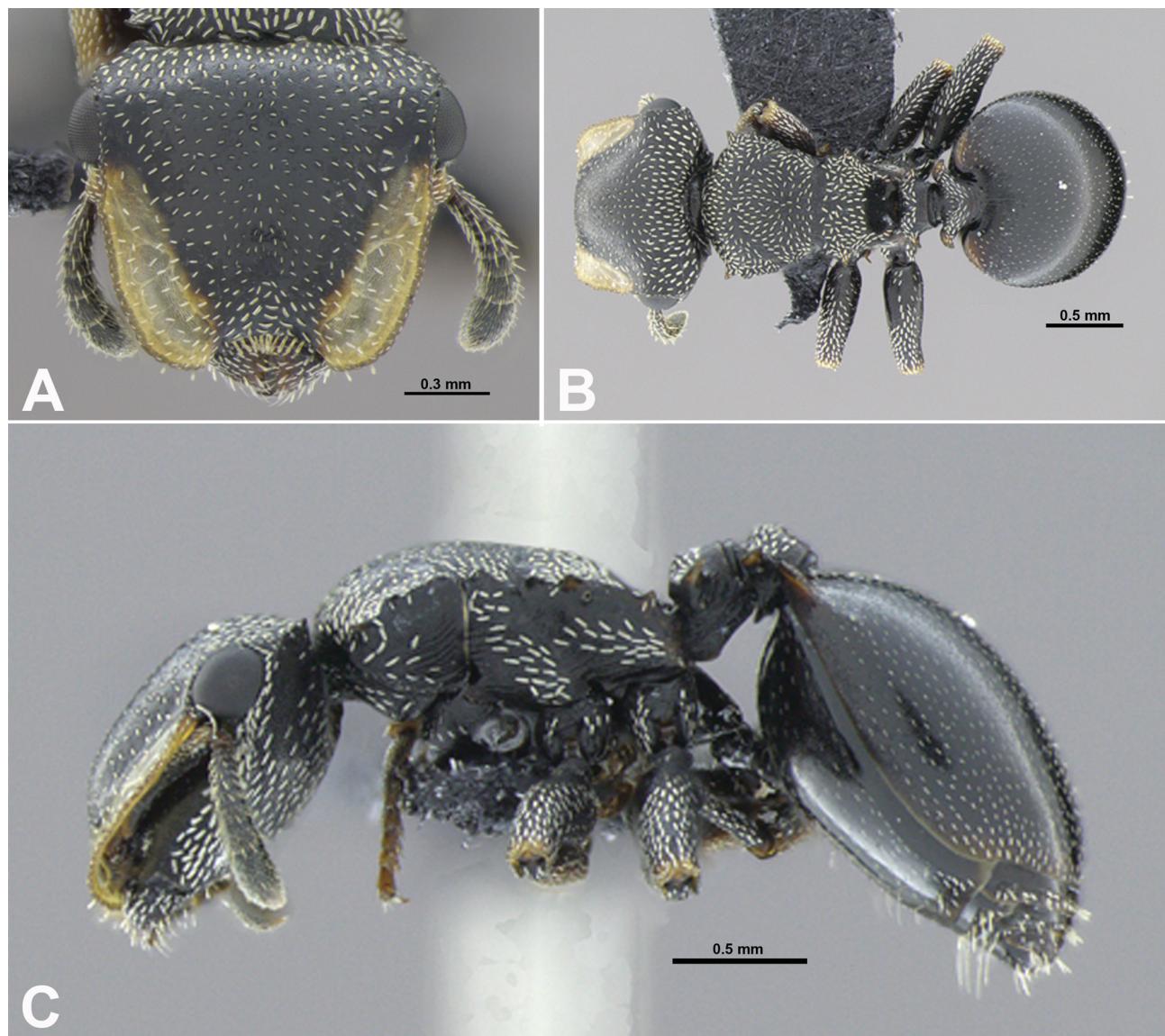


FIGURE 2. *Cephalotes specularis* n. sp. holotype minor worker in (a) face, (b) dorsal, and (c) profile view.

Pilosity cream-colored and composed by four types of hairs: (1) canaliculated, truncate, thick and appressed, generally originating from each fovea; similar hairs may be present in some parts of body without an associated foveae; (2) clavate and suberect on the mandibles, anterior margin of clypeus, borders of frontal carinae, apex of leg segments, and on the posterior border of gastral segments; (3) long, pointed and subdecumbent on external margins and ventral surface of mandibles, antennal funiculi, surface of abdominal terga 4–7 and on sterna 3–7; (4) minute and appressed, sparsely distributed on the dorsum of the first gastral tergite.

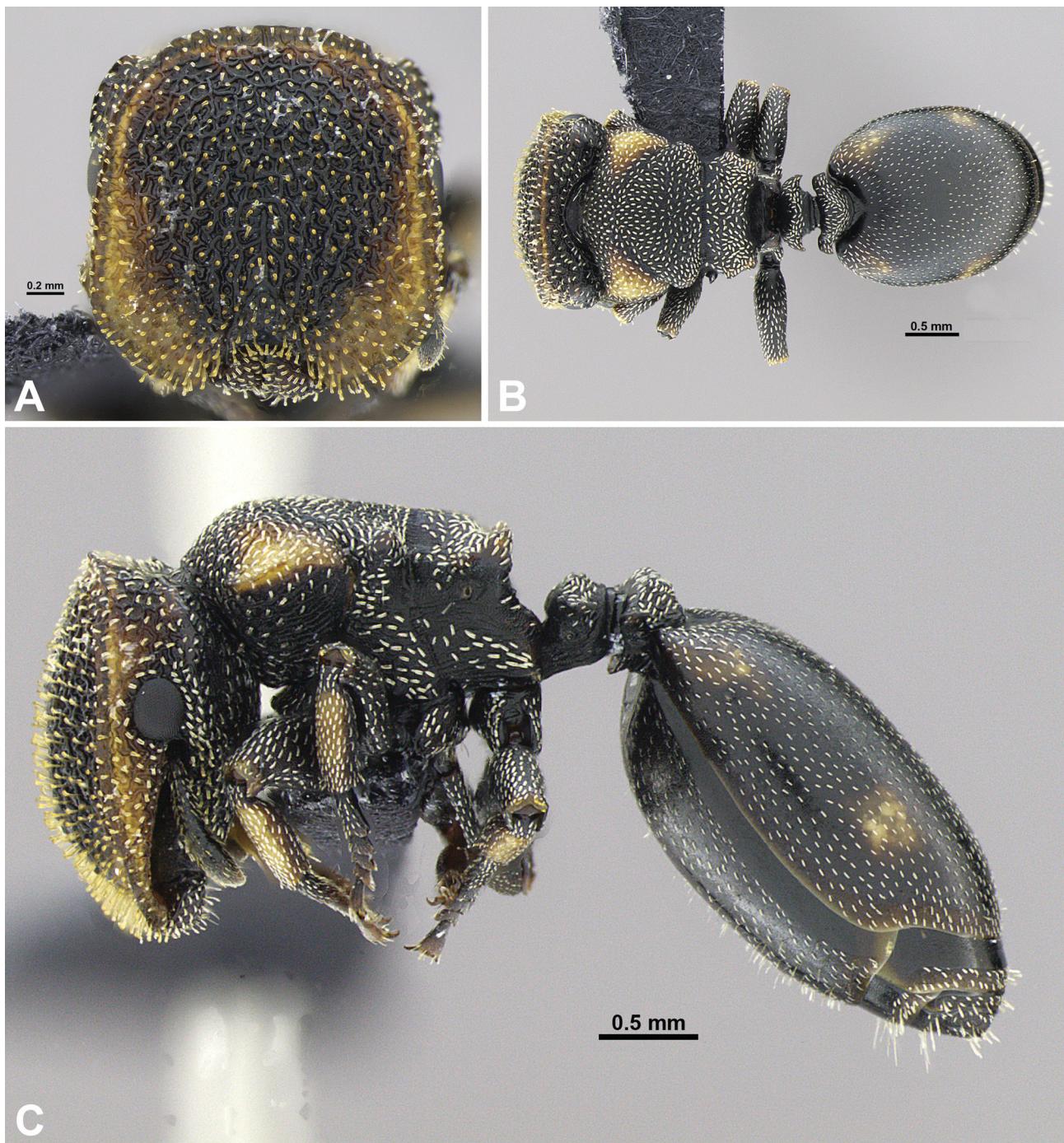


FIGURE 3. *Cephalotes specularis* n. sp. paratype major worker (soldier) in (a) face, (b) dorsal, and (c) profile view.

Head (Fig. 2a) as broad as long, anterolateral surfaces of frons and frontal lobes depressed. Mandibles with a conspicuous longitudinal lateral angle; anterior margin of clypeus slightly concave and simple, devoid of projections; external margins of frontal carinae (lateral margins of frontal lobes) weakly crenulate; frontal carinae minimally concave in front of the eyes and almost straight over the eyes; vertexal angles truncate, with an obtuse projection near the vertexal margin in full-face view; vertexal margin without projections and narrowly concave medially. Eyes situated behind and slightly above the antennal scrobes.

Mesosoma convex in lateral view (Fig. 2c), with a continuous dorsal profile. In dorsal view (Fig. 2b), anterior margin of pronotum evenly rounded; pronotum dorsum with two to three lateral pairs of irregular teeth; the first pair comparatively longer and acute and the following ones blunt to truncate. Promesonotal suture visible but shallowly impressed. Mesonotum with a pair of lateral irregular projections. Metanotal suture conspicuous in

dorsal view but only weakly impressed. Propodeum with dorsal and declivous faces continuous, and with the lateral margins converging backwards towards the petiolar insertion; in dorsal view, lateral margins of propodeum with two pairs of lateral teeth, the first short and blunt and the second larger and acute; declivous face of propodeum with a single pair of short acute lateral teeth, better seen in lateral view. Mid and hind femora not angulate dorsally; mid and hind basitarsi anteroposteriorly flattened and with subparallel dorsal and ventral faces.

Petiole strongly compressed anteroposteriorly, anterior margin with a discrete, narrow concavity medially, in dorsal view; petiolar dorsum without a transverse carina; lateral petiolar spines well developed and pointed, arising from the anterolateral portion of the petiole and strongly curved backwards; anteroventral process of petiole rounded in profile and expanded anteriorly, but without conspicuous projections. Postpetiole slightly broader than petiole and subtrapezoidal in dorsal view; postpetiolar lateral spines broad and curved backwards; subpostpetiolar process pronounced and anteriorly acute.

Gaster suboval, with a pair of well-developed thick anterolateral lobes, not extending posteriorly in the form of lateral lamellae.

Major worker (Fig. 3). HL 1.61–1.85; HW 1.52–1.73; EL 0.30–0.33; PW 1.33–1.59; WL 1.58–1.82; PTL 0.36–0.42; PTW 0.64–0.73; PPL 0.30–0.39; PPW 0.67–0.79; GL 1.73–2.12; TL 5.58–6.61; CI 92.98–98.18; OI 19.23–20.75; PI 56.87–63.64. Color predominantly black; frontal lobes and margins of cephalic disc yellowish; masticatory margins of mandibles and apices of the antennal scapes dark reddish-brown; lateral expansions of pronotum, apices of femora, dorsum of tibiae and body spines yellowish; first gastral tergite quadrimaculate (two pairs of yellow spots), the first pair close to the anterolateral lobes and the second one laterally placed on the posterior third of the tergite.

Dorsum of cephalic disc (Fig. 3a) strongly reticulate-rugose; rest of body superficially reticulate-punctate and weakly shiny. Dorsum of head and mesosoma foveolate, the foveae deeper and contiguous on the dorsum pronotum and mesonotum, slightly sparser and shallower on the dorsal face of propodeum, and only superficial on the ventral surface of head, external surfaces of femora and tibiae and dorsum of petiole and postpetiole; lateral surfaces of mesosoma with thin and short longitudinal subparallel rugosities; anterior third of first gastral tergite with a few short longitudinal rugosities originating near the postpetiole insertion, in a fan-like fashion.

Body with four types of hairs: (1) thick and appressed, generally originating from each fovea, somewhat shorter and thinner on the body parts without foveae; (2) strongly clavate and erect on the mandibles, anterior margin of clypeus, dorsal surface of cephalic disc (where they are particularly dark yellow), apex of tibiae, and on the posterior border of gastral segments; (3) long, pointed and suberect on external margins and ventral surface of mandibles, antennal funiculi, and ventral surface of gaster; (4) minute and appressed, sparsely distributed on the dorsum of the first gastral tergite.

Head slightly longer than broad and dorsally convex. Cephalic disc complete and raised, margins of disc convex posteriorly and strongly concave anteriorly, with lateral margins gently diverging towards mandibles, not completely hiding the eyes; frontal lobes margins and borders of head disc sharp, crenulate and expanded anterolaterally. Vertexal angles truncate and well-projected, without teeth or denticles; vertexal margin without projections and minimally concave medially. Mandibles with a strong longitudinal lateral angle.

Mesosoma almost entirely flat, in lateral view (Fig. 3c), except by a discrete anterior convexity formed by the ascending profile of the pronotum. In dorsal view (Fig. 3b), anterior margin of pronotum evenly rounded; humeral angles of pronotum considerably expanded and with an anterior pair of acute denticles followed by rounded lamellae. Promesonotal suture feebly impressed. Mesonotum strongly rounded laterally, and without projections. Metanotal suture conspicuous and impressed. Propodeum with well differentiate dorsal and declivous faces, with the latter gently converging posteriorly; in dorsal view, lateral margins of propodeum with a single median pair of obtuse teeth; propodeal spines well-developed, directed upwards, broad basally and acute at apex, in lateral view. Mid and hind femora not angulate dorsally; mid and hind basitarsi anteroposteriorly flattened and with subparallel dorsal and ventral faces

Petiole and postpetiole as in the conspecific worker, but with less developed lateral expansions.

Gaster with the anterolateral lobes protruding anteriorly, but without the membranaceous borders seen in the minor workers.

Gyne (Fig. 4–5). HL 1.70–1.76; HW 1.61–1.67; EL 0.33–0.37; PW 1.45–1.55; WL 2.30–2.36; PTL 0.46–0.55; PTW 0.67–0.73; PPL 0.42–0.48; PPW 0.79–0.82; GL 2.61–2.76; TL 7.61–7.79; CI 93.10–94.64; OI 20.75–22.64; PI 66.09–81.82. Very similar to the conspecific major worker, except by the characteristics expected for myrmicine gynes and a few additional traits (in comparison to workers):

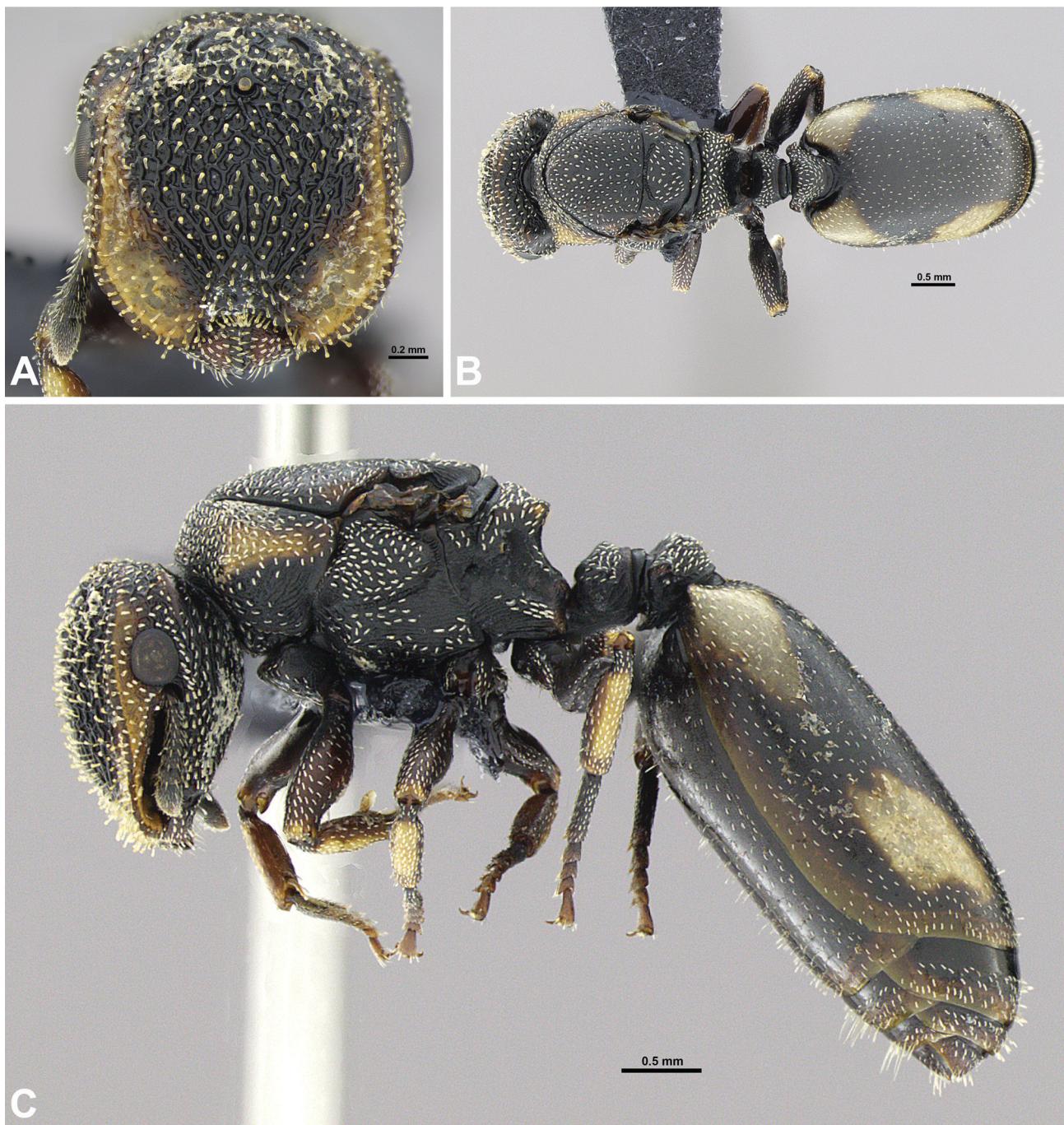


FIGURE 4. *Cephalotes specularis* n. sp. paratype gyne in (a) face, (b) dorsal, and (c) profile view.

Yellow spots on the gaster occupying a relatively broader area. Foveae sparser over mesosoma and petiole. Pilosity slightly sparser than in the major worker, especially on the dorsum of mesosoma and gaster.

Head (Fig. 4a) slightly longer than broad. Vertexal lobes shorter and less pronounced. Posterior portion of cephalic dorsum with a single median ocellus. In dorsal view, pronotum anteroposteriorly narrower than in the major worker and with the lateral projections reduced to small denticles (Fig. 4b); scutum large and subtriangular, with the anterior margin strongly rounded; notauli absent; parapsidial lines feebly visible and parallel; transcutal sulcus deeply impressed, but not reaching the lateral margins of mesosoma in dorsal view; scutoscutellar sulcus arched and formed by short and transverse subrectangular foveae; scutellum well-delimited and broad, at the same level as the scutum in lateral view (Fig. 4c); dorsal face of propodeum convex and meeting the declivous face in a pair of large short, blunt, and acute teeth.

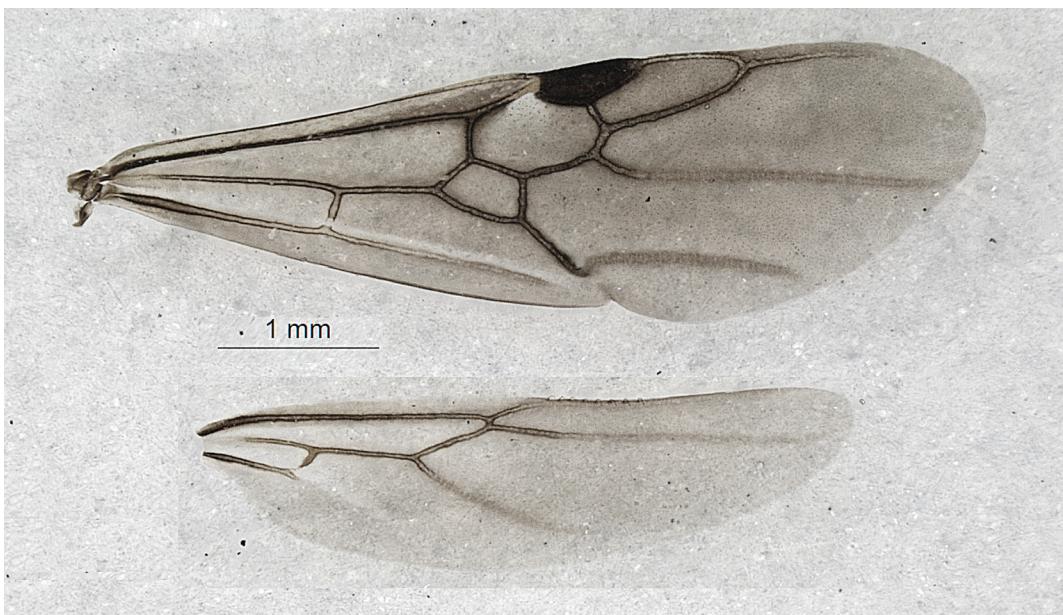


FIGURE 5. *Cephalotes specularis* n. sp. paratype gyne forewing (top) and hindwing (bottom).

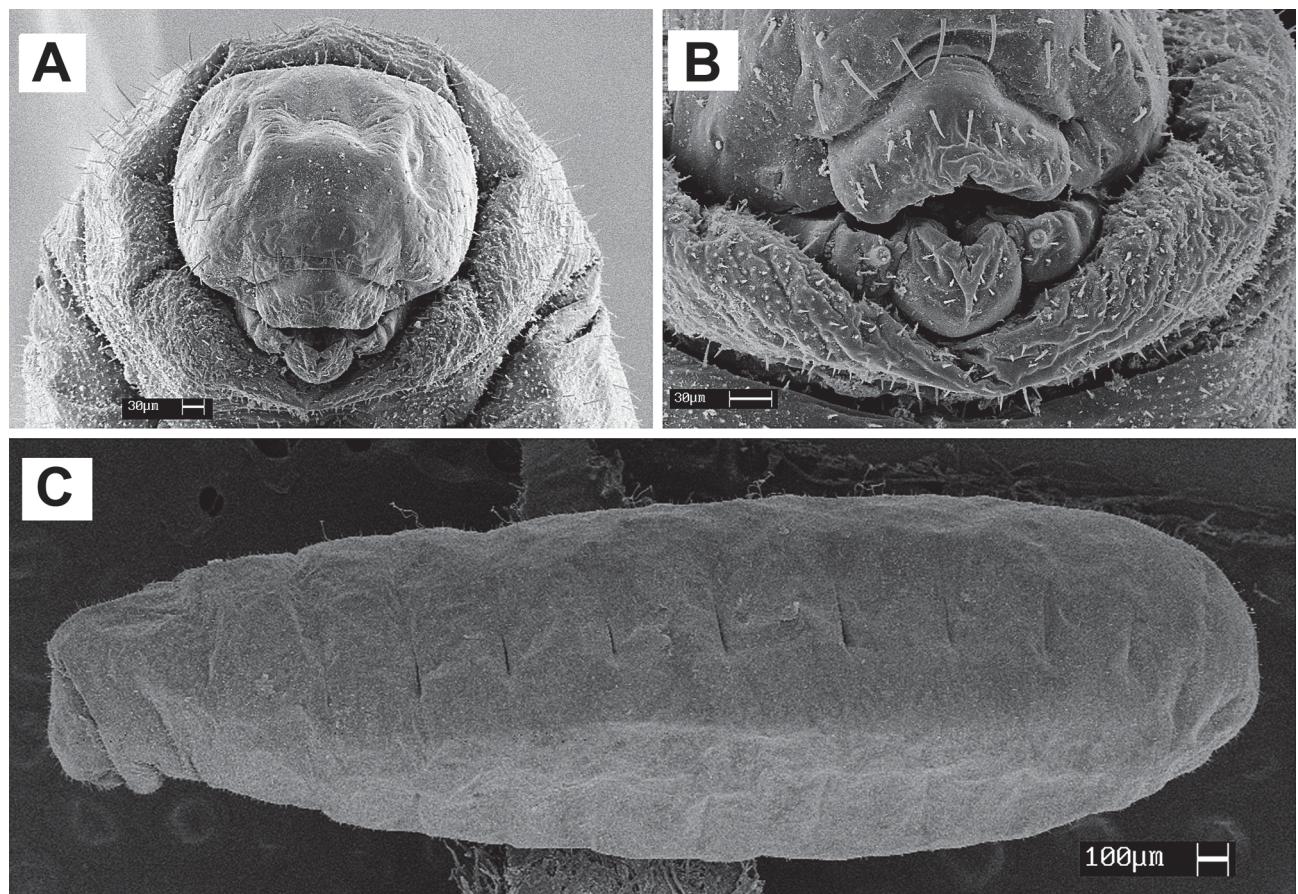


FIGURE 6. *Cephalotes specularis* n. sp. mature larva (a) head in full face, (b) detail of mouthparts and (c) total larva in profile view. Note the dorsal pairs of anchor-tipped hairs.

Wing venation developed, but lacking crossvein 2rs-m, rendering submarginal cell 2 open (Fig. 5). Forewing with a strongly pigmented stigma; anal vein spectral for most of its length, not attaining the cubitus (Cu) vein; media (M) and cubitus (Cu) extending distally beyond stigma as nebulous veins, not reaching the distal border of wing. Marginal cell closed; free R (at apex of marginal cell) long and distant from anterior wing margin; 1rs-m+M

abscissa of M arising from Rs+M more than half way between 1m-cu and 2r-rs. Hind wing with R+Rs mostly tubular until the junction with radius (R); M+Cu complete until the junction with radial sector and cubitus (Cu), the latter extending as spectral veins for most of their length and failing to reach the distal border of the wing; around eight submedian hamuli present.

Petiole with lateral projections reduced to a pair of small and blunt denticles. Postpetiole as in the major worker, but with the lateral projections less developed.

Gaster long and subcylindrical with protruding anterolateral lobes.

Male. Unknown (see comments below).

Larva (late instar) (Fig. 6). Length through spiracles: 4.2 mm. Profile pheidoloid (Fig. 6c). Segmentation more distinct near the lateral area of the body on the six first gastral segments. No leg or wing vestiges observed under SEM. Prothorax with a ventrolateral boss at each side. No other protuberances present. Anus subventral without lip. Spiracles not visible under SEM.

Integument spinulose, the spinules minute and in short to long subtransverse rows (more common or concentrated in different regions). Body hairs: minute (ca. 10 microns), dispersed and common throughout the body, longer (ca. 40 microns) hairs less common, also dispersed throughout the body. Six pairs of parallel, very approximate, flexuous, very long (200 microns) anchor tipped hairs on AI to AVI along the larva dorsal line; in AI and AII there is a single anchor-tipped hair laterally at each side of the dorsal pair.

Cranium subquadrate, with convex posterior margin (Fig. 6a). Head covered by sparse stiff minute hairs with less than 10 micra. Antennae at cranial dorsolateral areas, closer to posterior head margin than to clypeus, as a low circular convexity, only slightly elevated from cranium surface. Clypeus with 7–8 long (ca. 40 microns) stiff hairs, otherwise bare. Rectangular labrum, with almost straight anterior margin, bearing twelve 20 microns hairs concentrated in a row at labrum midlength. Mandible cephalotoid with one apical rounded tooth and no subapical teeth, covered by labrum when closed. Maxillae lobose (Fig. 6b), undivided (no discernible cardo and stipes), galea longer and wider than palp, paxilliform (relatively high cylinder) with two sensilla. Palp also paxilliform (low cylinder), with an apical sensillum. Labium hemispheric, with rounded anterior margin. Opening of sericteries not visible. Palp paxilliform, set anteriorly in the labium, with an apical sensilla. Hypopharynx not visible in the studied specimens

Etymology. The specific epithet refers to the reflective property of the minor worker gaster. From Latin “speculum” = mirror.

Comments. On morphological grounds, *Cephalotes specularis* belongs to de Andrade & Baroni-Urbani's *fiebrigi* species group. This is further supported by molecular phylogenetic analysis, with *C. specularis* as a member of a monophyletic clade that contains the *fiebrigi* and *bruchi* species groups (*C. specularis* is *C. sp1* in Price et al. 2014). Including *C. specularis*, the combined *fiebrigi* and *bruchi* groups comprise 12 species that are present in or limited to the “dry diagonal” (Cerrado, Caatinga, Chaco habitat types) that spans Brazil, Uruguay, Paraguay, and Argentina (de Andrade & Baroni Urbani, 1999; Price et al. 2014). *Cephalotes pilosus* (Emery) and *C. fiebrigi* (Forel) were recorded in caatingas in the Brazilian states of Bahia and even in Piauí, but also within the range of the arid diagonal. Members of *fiebrigi* and *bruchi* groups share the following characters: minor workers with three to four pairs of denticles on the sides of propodeum; first tergite of gaster with solid and membranaceous anterolateral expansions; and males (known for only four species) with very long gonostyli. However, de Andrade and Baroni-Urbani (1999) mentioned that the number of propodeal spines may be homoplasious among members of other species groups.

Morphologically, *C. specularis* is undoubtedly closer to *C. quadratus* (Mayr) than to any other species in the clade. In fact, *C. specularis* will key to couplet 25 of de Andrade & Baroni-Urbani's key to minor workers (1999: 738) and may be misidentified as *C. quadratus* on the basis of the vertexal angles of head without spines, cephalic dorsum covered with erect hairs, and head and mesosoma strongly convex. However, *C. specularis* can be readily distinguished from *C. quadratus* by the following features of the minor workers: gaster less sculptured and strongly shiny (rather opaque in *C. quadratus*); frontal carinae straight over the eyes (sinuous in *C. quadratus*); vertexal angles truncate (rounded in *C. quadratus*); first pair of pronotal denticles relatively long and acute (short and obtuse in *C. quadratus*); propodeum with barely differentiate dorsal and declivous faces (well differentiate faces in *C. quadratus*); and petiolar dorsum without a transversal carina separating the anterior face from the posterior one (transversal carina present in *C. quadratus*). In addition, the cephalic disc of *C. specularis* major workers is strongly reticulate-rugose while major workers have the cephalic disc only superficially foveolate-rugose in *C.*

quadratus. In fact, the heavily sculptured head disk of the *C. specularis* major worker is unique among all members of the *fiebrigi* clade.

Generally, the collection of full colonies of *Cephalotes* species in the reproductive period of the year leads to the finding of all castes and sexes. The colony from which the types were described was a reproductive colony that had not yet released its sexuals. In addition to this colony, two other colonies were collected from the same population. Although all three of these colonies contained alate gynes, none contained males. De Andrade & Baroni-Urbani (1999) already commented about the scarcity of males in the *Cephalotes* species of the *fiebrigi* and *bruchi* groups; males are known for only four out of the combined total of 12 species. Populations of the species in this group may exhibit split sex ratios (individual colonies specializing in male or female production; Kümmerli and Keller, 2009) as recorded for other *Cephalotes* species (S. Powell unpubl. data).

There is intraspecific variation in size of both worker castes and queens, as revealed in the ranges of measurements. The yellow pronotal and gasteral spots of major workers and gynes are often absent in the smallest "soldiers" and become more pronounced in the largest ones. Caste intermediates, with blended minor and major worker traits, are moderately common.

As far as we know, *C. specularis* is restricted to Cerrado areas of Uberlândia, state of Minas Gerais, Brazil. Collections were made from two field stations, the Clube Caça & Pesca Itororó (-19.004587°, -48.312506°) and Estação Ecológica Panga (-19.18235°, -48.39359°). However, the improvement in collection efforts in different localities of the Brazilian Cerrado may reveal new populations of this species.

Cephalotes specularis has been shown to engage in a new form of resource-based social parasitism of the host ant *Crematogaster ampla* Forel (Myrmicinae: Crematogastrini), which involves both mimicry of the host (Fig. 7) and eavesdropping on their pheromone trials (Powell et al., unpubl. data). Discovery of additional *C. specularis* populations will therefore be of great value in examining the nature of this parasitic relationship across the range of both host and parasite.

Cephalotes specularis minor workers assume a peculiar posture, raising their gaster to almost a vertical position when visiting *Crematogaster ampla* trails (see Fig. 7b). Minor workers of *Cephalotes umbraculatus* (*umbraculatus* clade of de Andrade & Baroni Urbani, 1999) and *C. biguttatus* (*multipinosus* clade, same reference) are able to raise their gasters to an extraordinary degree (up to 112° and 124° respectively) in a defensive posture while secreting clear, volatile fluids from the apex of the gaster that makes them distasteful to predators (Coyle, 1966). This extreme raise is achieved because of the marked inclination of the declivous face of the propodeum and the low, flat dorsal surface of the petiole, which lacks a truncate anterior face in both species. In *C. specularis* the petiole has a truncate, perpendicular anterior face in lateral view (Fig. 2c) and the gaster is raised up to 70° in relation to the horizontal plane by virtue of the upward flexing of the petiole-postpetiole and postpetiole-gaster joints.

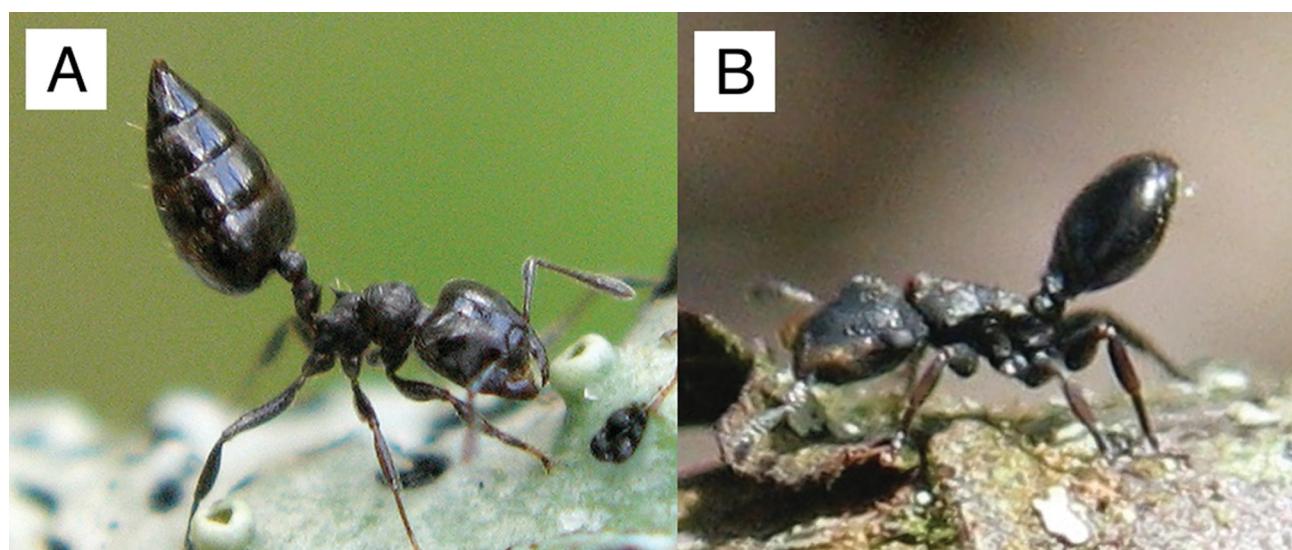


FIGURE 7. (a) *Crematogaster ampla* minor worker in defensive posture on a tree in the type locality of *Cephalotes specularis* n. sp. (b) *Cephalotes specularis* n. sp. mirroring posture of its host *C. ampla*.

Penick *et al.* (2012) observed that workers of several myrmicine genera (including *Cephalotes*) hang fourth-instar larvae from the walls and ceiling of their nests. This behavior was dependent on the presence of specialized anchor-tipped hairs that occur on the dorsal surface of these larvae, as observed for *C. specularis*. When larvae received “haircuts,” they were no longer able to adhere to the nest walls. The occurrence of anchor tipped larval hairs in numerous myrmicine genera suggests that larval hanging behavior is common and widespread in this group.

Acknowledgments

CRFB and RMF thank CNPq and FAPESP for continuous support. SP was funded by NSF grants DEB 0842144 and IOS 0841756, with additional support from the George Washington University. KDC thanks CNPq for financial grants. We thank Brendon Boudinot and an anonymous reviewer for suggestions to the manuscript. The authors thank Lara Guimarães and Ricardo Kawada for, respectively, the SEM and high resolutions images.

References

Coyle, F.A. (1966) Defensive behavior and associated morphological features in three species of the ant genus *Paracryptocerus*. *Insectes Sociaux*, 13, 93–104.
<http://dx.doi.org/10.1007/bf02223565>

De Andrade, M.L. & Baroni-Urbani, C. (1999) Diversity and adaptation in the ant genus *Cephalotes*, past and present (Hymenoptera, Formicidae). *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Palaontologie)*, 271, 1–889.

Feitosa, R.M. & Brandão, C.R.F. (2008) A taxonomic revision of the Neotropical myrmicine ant genus *Lachnomyrmex* Wheeler (Hymenoptera: Formicidae). *Zootaxa*, 1890, 1–49.

Kümmerli, R. & Keller, L. (2009) Patterns of split sex ratio in ants have multiple evolutionary causes based on different within-colony conflicts. *Biology Letters*, 5, 713–716.
<http://dx.doi.org/10.1098/rsbl.2009.0295>

Penick, C.A., Copple, R.N., Mendez, R.A. & Smith, A.A. (2012) The role of anchor-tipped larval hairs in the organization of ant colonies. *PLoS ONE*, 7, e41595.
<http://dx.doi.org/10.1371/journal.pone.0041595>

Price, S.L., Powell, S., Kronauer, D.J.C., Tran, L.A.P., Pierce, N.E. & Wayne, R.K. (2014) Renewed diversification is associated with new ecological opportunity in the Neotropical turtle ants. *Journal of Evolutionary Biology*, 27, 242–258.
<http://dx.doi.org/10.1111/jeb.12300>

Wheeler, G.C. & Wheeler, J. (1976) Ant larvae: review and synthesis. *Memoirs of the entomological Society of Washington*, 7, 1–168.

Yoshimura, M. & Fisher, B.L. (2011) A revision of male ants of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Dolichoderinae, *Zootaxa*, 2794, 1–34.